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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/727,746

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Heng Liu

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8880

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Haynes and Boone, LLP

IP Section

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EXAMINER

KACKAR, RAM N

ART UNIT

PAPER NUMBER

1792

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/727,746	<b>Applicant(s)</b> LIU, HENG	
	<b>Examiner</b> Ram N. Kackar	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 16,63-87,89-103,131 and 132 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16,63-87,89-103,131 and 132 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/11/2009, 2/11/2009</u> .                                    | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 63-87 and 89-103 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In this instance in the new amendment “and a top portion of the chamber cooperate to define a generally flat, continuous and unobstructed flow channel” and “effecting generally laminar flow of gas through the flow channel intermediate the top portion of the chamber and the wafer carrier” the underlined part is new matter.

Applicant points to drawing 5 and paragraph 98 for its support.

It is noted that there is no mention of a top portion in the specification.

Further, this can not be assumed to be the intention of the specification, since the structural requirement for laminar flow is cited to be only to have outlets above the surface of the wafer carrier.

Regarding drawing 5, reliance only on this drawing is improper, since the drawing is a mere schematic and is not according to scale.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**4. Claims 16 and 131-132 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tabata et al (US 2003/0133854).**

Tabata et al disclose a plurality of small chambers for chemical vapor deposition (Fig 2 501, 502 and 503) connected to common gas supply of nitrogen through flow controllers 611-613 and ozone through flow controllers 401-403 and a common exhaust 71.

**5. Claims 63-67, 71-75, 78-84, 87, 89 -93 and 96 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jurgensen et al (WO 02/18672).**

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above

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the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13). Sealing is by the diffusion ring (14). Jurgensen et al further disclose that the diffusion ring is made in the same way as support plate, tension plate, carrier plate and cover plate (para. 16) which are shown to be made of graphite with SiC coating. The flow of reactant gases is laminar since there is no obstruction in the flow until exhaust out of the chamber.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**7. Claims 63-87, 89-93 and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Ikeda et al (JP 62211914).**

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates (*disclosed number is 5*) sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13). Sealing

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is by diffusion ring which works both as a seal ring and diffusion ring (14). Jurgensen et al further disclose that the diffusion ring is made in the same way as support plate, tension plate, carrier plate and cover plate (para. 16) which are shown to be made of graphite with SiC coating.

Regarding the distance between the wafer carrier and top of the chamber, diameter of the gas inlet and speed of rotation of the carrier, these are result effective parameters and their optimization would be obvious for one of ordinary skill in the art at the time of invention.

Jurgensen et al disclose discharge ring for allowing gases to pass symmetrically over the substrate but do not disclose that the outlets through a hollow ring to collect for disposal.

Ikeda et al disclose a diffuser, which is a hollow ring with plurality of inlets and outlets (Fig 2 B and C).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use a hollow ring to guide exhaust gases out of the chamber in order to have an orderly and laminar removal of exhaust gases.

**8. Claims 94-95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of MacLeish et al (US 6113984).**

Jurgensen et al disclose inductive heating which is equivalent to radiation heating.

MacLeish et al disclose a CVD coating device having a rotatable wafer carrier (Fig 14-116, Fig 1-48) sealed at a periphery to facilitate laminar flow (Abstract, Fig 14-130 and Col 14 lines 55-59), bottom of the chamber defined by the carrier (Fig 14-115, Fig 1-50), heater outside the chamber (Fig 2-44 and Fig 14-124) to heat the carrier, a shaft for rotating the wafer carrier (Fig 14-116, Fig 1-48) and a small distance from carrier to top (Fig 14-106, Fig 1-34a)

Regarding claim 95 MacLeish discloses purge of the area outside of reaction chamber 34a (Col 9 lines 53-60).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use radiant heating instead of inductive heating as being equivalent.

**9. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745).**

Jurgensen et al do not disclose using alkyl and ammonia gas and do not teach the possibility of parasitic pre-reaction between the two.

Van de Walle et al disclose an MOCVD coating device having a rotatable wafer carrier (Fig 17 and paragraph 49) to process substrates using alkyl gas like trimethylaluminum and ammonia (Paragraph 38 and 49) and teach that to prevent pre-reaction between alkyl gas and ammonia gases are introduced in the chamber separately- ammonia from inlet 1720 and alkyl gas from 1710 (Paragraph 49) to reduce requirement of carrier gas like Hydrogen.

Therefore keeping alkyl gas and ammonia separate until needed for deposition reaction would have been obvious for one of ordinary skill in the art at the time of invention.

**10. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745) and further in view of Hirooka (US 4812331).**

Jurgensen et al in view of Van de Walle et al disclose keeping alkyl gas and ammonia separate and disclose a structure for doing that but not as explicit as claimed.

Hirooka et al disclose a deposition system having multiple gas inlets separated from each other and concentric to each other (Fig 1) and disclose several ways of connecting gas supplies before entering the chamber (Fig 1) which includes pre-mixing as well as mixing only at the entrance of the chamber through concentric tubes (a, b, c).

Therefore connecting inlets separately as in Hirooka et al so as to prevent parasitic pre-reaction would be obvious to one of ordinary skill in the art at the time of invention.

### ***Response to Arguments***

Applicant's arguments filed 2/6/2009 have been fully considered but they are not persuasive.

Applicant's arguments against Tabata et al are not persuasive. Tabata et al teach many other things in addition to what is the subject matter of claims 16 and 131-132. There is nothing to suggest that all additional teaching by Tabata et al must be incorporated in a claimed simple common gas and common exhaust arrangement.

Omission of an element with a corresponding omission of function is within the level of ordinary skill. *In re Wilson* 153 USPQ 740 (CCPA 1967); *In re Portz* 145 USPQ 397 (CCPA 1965); *In re Larson* 144 USPQ 347 (CCPA 1965); *In re Karlson* 136 USPQ 184 (CCPA 1963); *In re Listen* 58 USPQ 481 (CCPA 1943); *In re Porter* 20 USPQ 298 (CCPA 1934).

It is common to have plurality of chambers running same process for throughput reason. It would be common sense to connect utilities in parallel to such process chambers. It is noted



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that gas inlet and outlet are mere utilities. Further, it would be necessary to provide flow meters at the inlet since process must require predetermined flow.

Applicant argues that Jurgensen fails to disclose teach or suggest providing a chamber containing a wafer carrier wherein the wafer carrier and a top portion of the chamber cooperate to define a generally flat, continuous and unobstructed flow channel as recited in claim 63.

In response, it is noted that the gas inlet 49 is a part of the top portion of the chamber. Further gas flow discharge is above the carrier until gases flow out of the chamber.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Ram N Kackar/  
Primary Examiner, Art Unit 1792